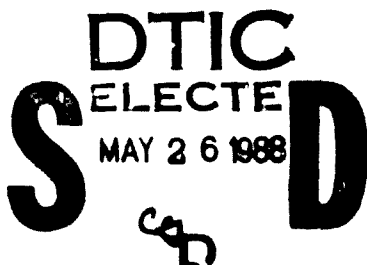**DTIC FILE COPY** (3)

ORAL HEALTH COMPARISON OF U.S. AIR FORCE AVIATORS: AEROMEDICAL EVALUATION REFERRALS VERSUS SURVEY OF AVIATOR POPULATION

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Data on the decayed, missing, and filled surfaces and teeth of aeromedical evaluation referrals were compared to that of the USAF aviator population. Although the aviator population had a significantly larger number of decayed surfaces and teeth ($p < .01$ to $p < .001$), this difference could be explained by the population survey looking at the worst case scenario. When looking at the total decayed, missing, and filled surfaces and teeth (DMFS and DMFT), there was essentially no significant difference between the oral health status of the aeromedical evaluation referrals and the USAF aviator population.

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ORAL HEALTH COMPARISON OF U.S. AIR FORCE AVIATORS: AEROMEDICAL EVALUATION REFERRALS VERSUS SURVEY OF AVIATOR POPULATION

INTRODUCTION

The U.S. Air Force (USAF) Dental Investigation Service (DIS) conducts a comprehensive study of the oral health status of active duty U.S. Air Force personnel every 5 years. The DIS also performs the oral diagnosis portion of the aeromedical evaluation of flying personnel referred to the USAF School of Aerospace Medicine under the provisions of Air Force Regulation 160-43, "Medical Examinations and Medical Standards."

In this study, we compared the oral health status of the aeromedical evaluation referrals to that of a survey of the USAF aviator population, to determine if the latter group had any unique dental problem. The data used in this study were derived from the methodology developed for the 1982 Dental Needs Study. The data have been arranged for this statistical analysis and should not be used in this form for other analyses.

METHODS

Population Survey

DIS obtained a representative cross section of the USAF by selecting a 1% stratified random sample of the total active duty population. The stratification was by grade (military rank), with the sample including 1% of the total number of personnel in each military grade. The subjects were randomly selected as they reported for their annual dental examinations at 42 Air Force bases. (The random sampling was distributed proportionally among the selected bases according to their relative size.)

A project officer (PO) was assigned at each base to conduct the local survey. The POs were provided with an instructional manual explaining the purpose of the study, test methods, and how to complete the survey forms. The POs were given a pretest to evaluate the examination and reporting techniques.

A Type II, comprehensive, dental examination with radiographs was performed on each patient. Individual patient examination data were captured on a series of 5 optical mark sensor forms. Patient demographic data, dental needs, existing oral conditions, plaque scores, calculus scores, and periodontal scores were recorded for each active duty member included in the survey sample.

At the end of the examination phase, all completed survey forms were returned to DIS for verification and analysis.

Referral Data

During the survey period, the same survey forms were completed on each aeromedical evaluation referral that reported for dental examinations at DIS.

Data Analysis

After a visual check for improper markings or other readily apparent errors, the forms were processed through an optical scanning device. The data were read by a PDP 11/760 computer at the USAF School of Aerospace Medicine and were analyzed on the computers of the Second Computer Systems Group of the USAF Communications Command.

A total of 5,483 active duty personnel were examined during the survey. Data were extracted from this total for the 517 aviators included in the survey.

A total of 1,017 referral personnel were examined during this period, and data from the forms were used in the comparison.

The data were analyzed according to the following age group of the personnel: 17-24, 25-29, 30-34, 35-39, 40-49, and 50+ years.

Comparisons were made according to the number of decayed (D), missing (M), and filled (F) teeth (T) and surfaces (S) of personnel within each age group.

A t-test analysis was performed between the mean scores of the survey population and evaluation referrals by age group for the following areas:

Including 3rd molars	Excluding 3rd molars
Decayed surfaces	Decayed surfaces
Missing surfaces	Missing surfaces
Filled surfaces	Filled surfaces
Total DMF surfaces	Total DMF surfaces
Decayed teeth	Decayed teeth
Missing teeth	Missing teeth
Filled teeth	Filled teeth
Total DMF teeth	Total DMF teeth

The mean values per individual by age group for the scores used in the t-test analysis are shown in Table 1.

A chi-square analysis was performed for each mentioned area (except total DMFS and DMFT) within each age group, as well as a comparison of the overall

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age groups themselves. For this analysis, we decided to categorize the scores for each area as follows:

Decayed surfaces	Missing surfaces	Filled surfaces
0	0	0-9
1-2	5-10	10-19
3-4	15-20	20-29
5-6	25-30	30-39
7-8	35-45	40-49
9+	50+	50+

Decayed teeth	Missing teeth	Filled teeth
0	0	0-4
1	1-2	5-9
2	3-4	10-14
3	5-6	15-19
4-5	7-8	20+
6+	9+	

Age group

17-24
25-29
30-34
35-39
40-49
50+

The scores that were used in the chi-square analysis are shown in Tables 2 and 3.

RESULTS

Mean Score Analysis

Results of the t-test analysis are tabulated in Table 4. The number of DMFS and DMFT, by age group, are shown in Figures 1-4. There was no significant difference noted between the evaluation referrals and the aviator population for filled surfaces or total DMFT when including or excluding 3rd molars.

There was no significant difference for total DMFS except for the 30-34 years age group which was significant at p<.05 when including 3rd molars.

There was no significant difference for missing surfaces or missing teeth (Fig. 5) when including 3rd molars. When excluding 3rd molars, the 30-34 years age group of the survey population had significantly more missing surfaces (p<.05) and missing teeth (p<.05) than the referrals.

There were no significant differences in filled teeth (Fig. 6), except for the 17-24 years age group of the referrals which had significantly (p<.05) more filled teeth when including or excluding 3rd molars.

There was a significant difference (p<.01 to p<.001) for decayed surfaces and decayed teeth when including or excluding 3rd molars except for the 50+ years age group with the population having more decayed surfaces and teeth than the referrals. These areas are shown in Figures 7-16.

Score Analysis

The chi-square analysis found the same areas to be significant as the t-test except for two areas. The filled teeth, including and excluding 3rd molars, were found to be not significantly different between the survey and referral groups for the 17-24 years age group. The results of the chi-square analysis are tabulated in Table 5.

The difference between the ages of the evaluation referrals and the aviator population survey was found to be significant at p<.001 with the referrals generally being older. The percent of subjects in each age group and a negative skew can be observed for the evaluation referrals in Figure 17.

DISCUSSION

The USAF dental health program for active duty personnel is based on a mandatory, periodic examination using a 12-month recall schedule. If any disease is diagnosed, the patient is scheduled for definitive treatment. If no disease is diagnosed or after all treatment has been completed, the individual is not seen again until the next periodic examination.

The subjects who were examined in the population survey were reporting for their periodic dental examination and were, therefore, not under dental treatment. Since the subjects had gone 1 year since their last comprehensive dental examination, their oral health status represented the worst case scenario.

On the contrary, the subjects in the evaluation of referrals could have been at any point in the periodic examination/treatment cycle. The subjects

may have been at the point of requiring an examination or may have just completed definitive dental treatment with no existing oral disease. This treatment cycle would explain why the subjects of the population survey tended to have more decayed surfaces and teeth while the referral subjects tended to have more filled teeth.

Since the total scores of decayed, missing, and filled surfaces and teeth reflect the combinations of the different conditions, they would give a better overall picture of the subjects' health at the time of the examination. When looking at the total DMFS and DMFT scores, there is essentially no difference between the oral health status of the aeromedical evaluation referrals and the USAF aviator population.

This exercise of comparing these two sets of data serves to verify that the survey methods used by the USAF Dental Investigation Service to establish oral health needs provides an accurate representation of the USAF population. The methodology discussed applied to that formulated for the 1982 Dental Needs Study. The findings of this study may or may not be applicable to the methodology used in past or future studies.

TABLE 1. DMF MEAN VALUES/INDIVIDUAL BY AGE GROUP

	17-24 Pop/Refer		25-29 Pop/Refer		30-34 Pop/Refer		35-39 Pop/Refer		40-49 Pop/Refer		50+ Pop/Refer	
Including 3rd molars												
Decayed surfaces	4.0	0.4	4.0	1.1	3.3	1.0	3.0	1.1	5.2	1.2	2.3	1.9
Missing surfaces	16.0	15.1	18.4	17.1	19.9	17.2	20.7	18.1	22.2	21.4	46.3	28.2
Filled surfaces	11.8	14.9	20.2	20.3	22.8	22.7	30.3	30.4	34.0	37.0	48.0	41.7
DMFS	31.8	30.4	42.7	38.5	46.0	40.8	54.0	49.6	61.4	59.6	96.5	71.8
Decayed teeth	1.7	0.3	1.5	0.5	1.3	0.5	1.1	0.5	1.7	0.6	1.0	0.7
Missing teeth	3.2	3.0	3.7	3.4	4.0	3.4	4.1	3.6	4.4	4.3	9.3	5.6
Filled teeth	6.5	8.0	9.4	9.7	10.1	10.7	12.5	12.5	13.0	14.0	15.5	13.5
DMFT	11.4	11.4	14.8	13.8	15.5	14.7	17.9	16.8	19.3	19.1	26.0	20.0
Excluding 3rd molars												
Decayed surfaces	2.9	0.2	2.9	0.8	2.6	0.9	2.5	1.0	4.9	1.2	2.3	1.8
Missing surfaces	6.3	3.5	6.4	5.2	6.4	3.9	9.1	5.7	9.1	8.6	28.8	14.9
Filled surfaces	11.6	14.6	19.8	19.9	22.0	22.2	29.2	29.4	32.6	35.5	47.3	40.0
DMFS	20.8	18.4	29.2	25.9	31.0	27.1	40.7	36.1	46.6	45.3	78.3	56.7
Decayed teeth	1.4	0.2	1.3	0.4	1.1	0.5	0.9	0.5	1.6	0.5	1.0	0.6
Missing teeth	1.3	0.7	1.3	1.0	1.3	0.8	1.8	1.1	1.8	1.7	5.8	3.0
Filled teeth	6.4	7.8	9.1	9.5	9.6	10.2	11.7	11.9	12.2	13.2	15.0	12.7
DMFT	9.0	8.8	11.9	11.0	12.1	11.6	14.6	13.7	15.8	15.6	22.0	16.5

TABLE 2. DMFS SCORES BY AGE GROUP

	17-24 Pop/Refer		25-29 Pop/Refer		30-34 Pop/Refer		35-39 Pop/Refer		40-49 Pop/Refer		50+ Pop/Refer	
Age(total in each group)	71	93	122	146	126	123	97	249	97	339	4	67
Including 3rd molar												
Decayed surfaces												
0	32	80	61	103	66	86	50	171	49	228	3	42
1-2	7	10	13	26	16	18	16	42	10	55	0	9
3-4	6	1	10	4	6	10	11	13	10	28	0	7
5-6	10	1	9	8	11	5	7	12	8	13	0	4
7-8	4	0	6	1	9	3	3	6	5	6	0	1
9+	12	1	23	4	18	1	10	5	15	9	1	4
Missing surfaces												
0	8	22	21	28	15	21	17	28	10	27	0	4
5-10	11	17	19	24	14	15	7	47	14	46	0	6
15-20	28	37	53	66	62	65	43	117	38	143	1	27
25-30	10	8	14	14	21	10	16	35	25	79	1	14
35-45	2	9	11	13	9	12	10	17	7	31	0	8
50+	2	0	4	1	5	0	4	5	3	13	2	8
Filled surfaces												
0-9	33	38	22	31	22	19	10	17	3	10	0	1
10-19	25	35	54	52	38	43	17	63	14	56	1	6
20-29	8	9	20	32	34	27	27	48	24	56	1	12
30-39	3	4	15	23	13	18	15	50	26	68	0	14
40-49	2	4	4	4	12	8	12	35	13	71	0	11
50+	0	3	7	4	7	8	16	36	17	78	2	23

TABLE 2. DMFS SCORES BY AGE GROUP (continued)

Excluding 3rd Molars

Decayed surfaces

	17-24 Pop	17-24 Refer	25-29 Pop	25-29 Refer	30-34 Pop	30-34 Refer	35-39 Pop	35-39 Refer	40-49 Pop	40-49 Refer	50+ Pop	50+ Refer
0	38	83	70	109	69	88	54	174	52	231	3	43
1-2	7	7	14	23	20	16	14	41	8	54	0	9
3-4	5	1	11	4	6	11	13	14	11	27	0	6
5-6	9	2	9	7	10	5	7	11	7	13	0	5
7-8	5	0	4	1	7	2	3	4	5	6	0	0
9+	7	0	14	2	14	1	6	5	14	8	1	4

Missing surfaces

	17-24 Pop	17-24 Refer	25-29 Pop	25-29 Refer	30-34 Pop	30-34 Refer	35-39 Pop	35-39 Refer	40-49 Pop	40-49 Refer	50+ Pop	50+ Refer
0	43	67	76	100	70	88	43	145	47	159	1	19
5-10	17	13	19	21	35	14	29	65	30	96	1	24
15-20	8	13	21	23	12	21	18	26	13	44	0	13
25-30	2	0	2	1	3	0	4	8	3	24	0	4
35-45	0	0	3	0	5	0	1	3	1	9	0	3
50+	1	0	1	1	1	0	2	2	3	7	2	4

Filled surfaces

	17-24 Pop	17-24 Refer	25-29 Pop	25-29 Refer	30-34 Pop	30-34 Refer	35-39 Pop	35-39 Refer	40-49 Pop	40-49 Refer	50+ Pop	50+ Refer
0-9	33	39	22	32	23	21	12	21	3	12	0	1
10-19	25	35	55	53	42	41	19	61	16	56	1	6
20-29	9	8	20	30	30	30	25	52	26	65	1	13
30-39	2	4	14	23	15	15	15	50	25	72	0	15
40-49	2	4	4	4	10	9	11	37	11	65	0	10
50+	0	3	7	4	6	7	15	28	16	69	2	22

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TABLE 3. DMFT SCORES BY AGE GROUP

Including 3rd molars

	17-24 Pop	Refer	25-29 Pop	Refer	30-34 Pop	Refer	35-39 Pop	Refer	40-49 Pop	Refer	50+ Pop	Refer
Decayed teeth												
0	32	80	59	103	65	86	50	167	48	224	3	42
1	13	9	19	29	21	25	2'	55	21	73	0	18
2	7	1	11	8	14	6	11	16	8	27	0	2
3	5	1	11	4	8	3	7	6	7	10	0	2
4-5	10	2	16	1	14	2	6	5	7	1	1	2
6+	4	0	6	1	4	1	2	0	6	4	0	1
Missing teeth												
0	18	22	21	28	15	21	17	28	10	27	0	4
1-2	11	17	19	24	14	15	7	47	14	46	1	6
3-4	28	37	53	66	62	65	43	117	38	143	1	27
5-6	10	8	14	14	21	10	16	35	25	79	1	14
7-8	1	9	11	13	9	12	10	16	4	25	0	8
9+	3	0	4	1	5	0	4	6	6	19	2	8
Filled teeth												
0-4	24	20	14	11	13	11	6	10	4	11	0	2
5-9	35	42	55	64	47	36	17	57	19	49	0	10
10-14	10	23	43	54	43	50	40	102	36	125	2	30
15-19	2	5	10	16	20	22	28	59	27	110	2	19
20+	0	3	0	1	3	4	6	21	11	44	0	6

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TABLE 3. DMFT SCORES BY AGE GROUP (continued)

Excluding 3rd molars	17-24 Pop	Refer	25-29 Pop	Refer	30-34 Pop	Refer	35-39 Pop	Refer	40-49 Pop	Refer	50+ Pop	Refer
Decayed teeth												
0	38	83	68	109	68	88	53	170	51	227	3	43
1	11	7	17	26	24	23	22	54	19	72	0	18
2	6	2	10	7	12	6	10	16	9	26	0	2
3	4	0	12	2	8	3	6	5	5	9	0	1
4-5	9	1	10	1	10	2	5	4	7	1	1	2
6+	3	0	5	1	4	1	1	0	6	4	0	1
Missing teeth												
0	43	67	76	100	70	88	43	145	47	159	1	19
1-2	17	13	19	21	35	14	29	65	30	96	1	24
3-4	8	13	21	23	12	21	18	26	13	44	0	13
5-6	2	0	2	1	3	0	4	8	3	24	0	4
7-8	0	0	1	0	5	0	1	2	1	7	0	2
9+	1	0	3	1	1	0	2	3	3	9	2	5
Filled teeth												
0-4	25	20	14	11	13	11	7	10	4	13	0	2
5-9	35	46	58	69	55	40	24	64	22	53	0	13
10-14	9	20	40	52	39	53	39	108	39	150	2	30
15-19	2	4	10	13	17	17	24	55	24	90	2	18
20+	0	3	0	1	2	2	3	12	8	33	0	4

TABLE 4.   T-TEST ANALYSIS SIGNIFICANCE OF DIFFERENCE BY AGE GROUP

Referrals vs. population survey

	17-24	25-29	30-34	35-39	40-49	50+
Including 3rd Molars						
Decayed surfaces	<.001	<.001	<.001	<.005	<.005	N.S
Missing surfaces	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Filled surfaces	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
DMFS	N.S.	N.S.	<.05	N.S.	N.S.	N.S.
Decayed teeth	<.001	<.001	<.001	<.005	<.001	N.S.
Missing teeth	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Filled teeth	<.05	N.S.	N.S.	N.S.	N.S.	N.S.
DMFT	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Excluding 3rd Molars						
Decayed surfaces	<.001	<.001	<.001	<.01	<.005	N.S.
Missing surfaces	N.S.	N.S.	<.05	N.S.	N.S.	N.S.
Filled surfaces	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
DMFS	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Decayed teeth	<.001	<.001	<.001	<.005	<.005	N.S.
Missing teeth	N.S.	N.S.	<.05	N.S.	N.S.	N.S.
Filled teeth	<.05	N.S.	N.S.	N.S.	N.S.	N.S.
DMFT	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

TABLE 5.   CHI-SQUARE ANALYSIS SIGNIFICANCE OF DIFFERENCE BY AGE GROUP

Referrals vs. population survey

	17-24	25-29	30-34	35-39	40-49	50+
Including 3rd Molars						
Decayed surfaces	<.001	<.001	<.001	<.005	<.001	N.S.
Missing surfaces	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Filled surfaces	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Decayed teeth	<.001	<.001	<.005	<.005	<.001	N.S.
Missing teeth	N.S.	N.S.	N.S.	N:S.	N.S.	N.S.
Filled teeth	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Excluding 3rd Molars						
Decayed surfaces	<.001	<.001	<.001	<.05	<.001	N.S.
Missing surfaces	N.S.	N.S.	<.001	N.S.	N.S.	N.S.
Filled surfaces	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Decayed teeth	<.001	<.001	<.05	<.05	<.001	N.S.
Missing teeth	N.S.	N.S.	<.001	N.S.	N.S.	N.S.
Filled teeth	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
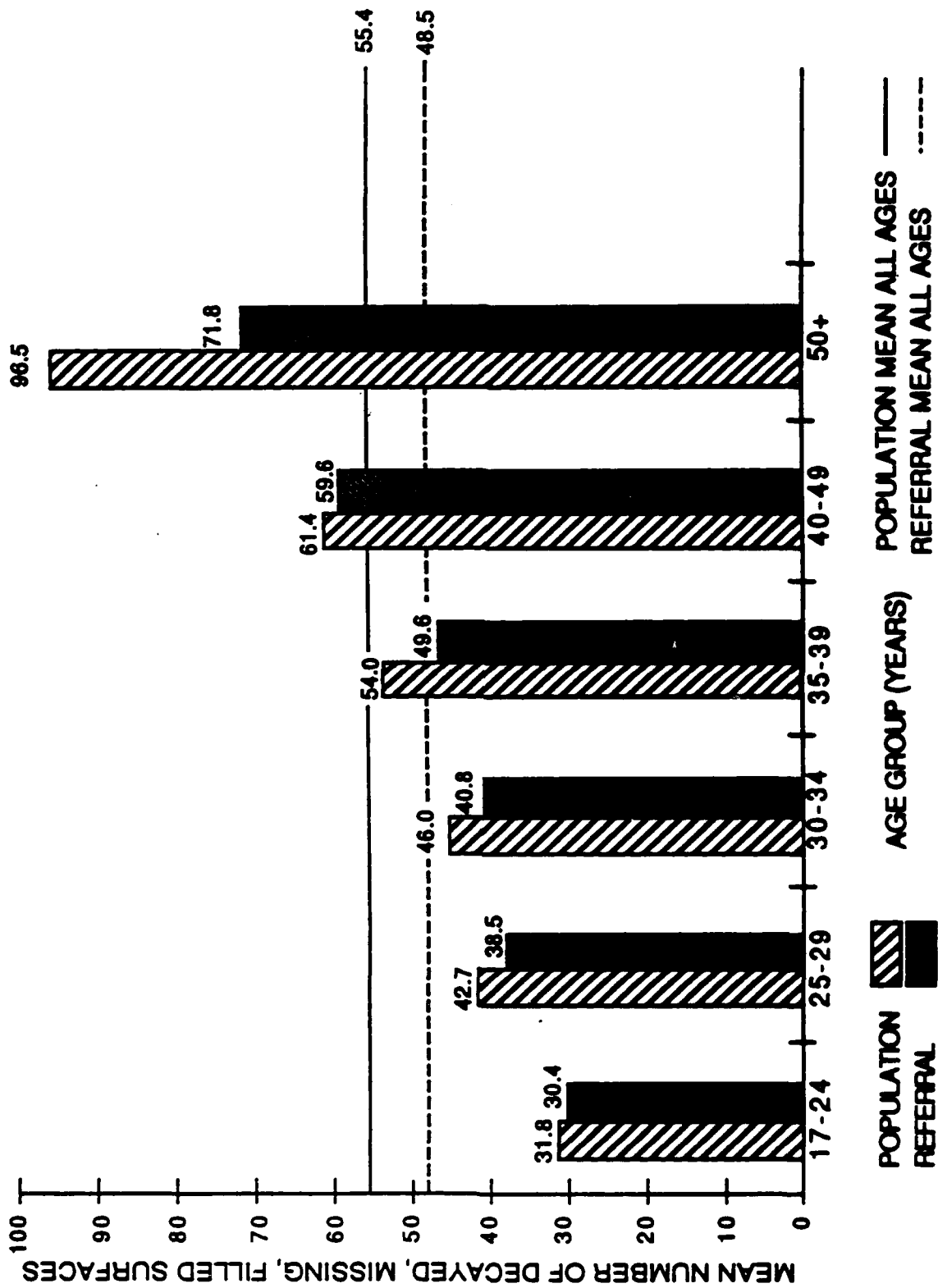
Figure 1. DMF surfaces: referral vs. population including third molars.

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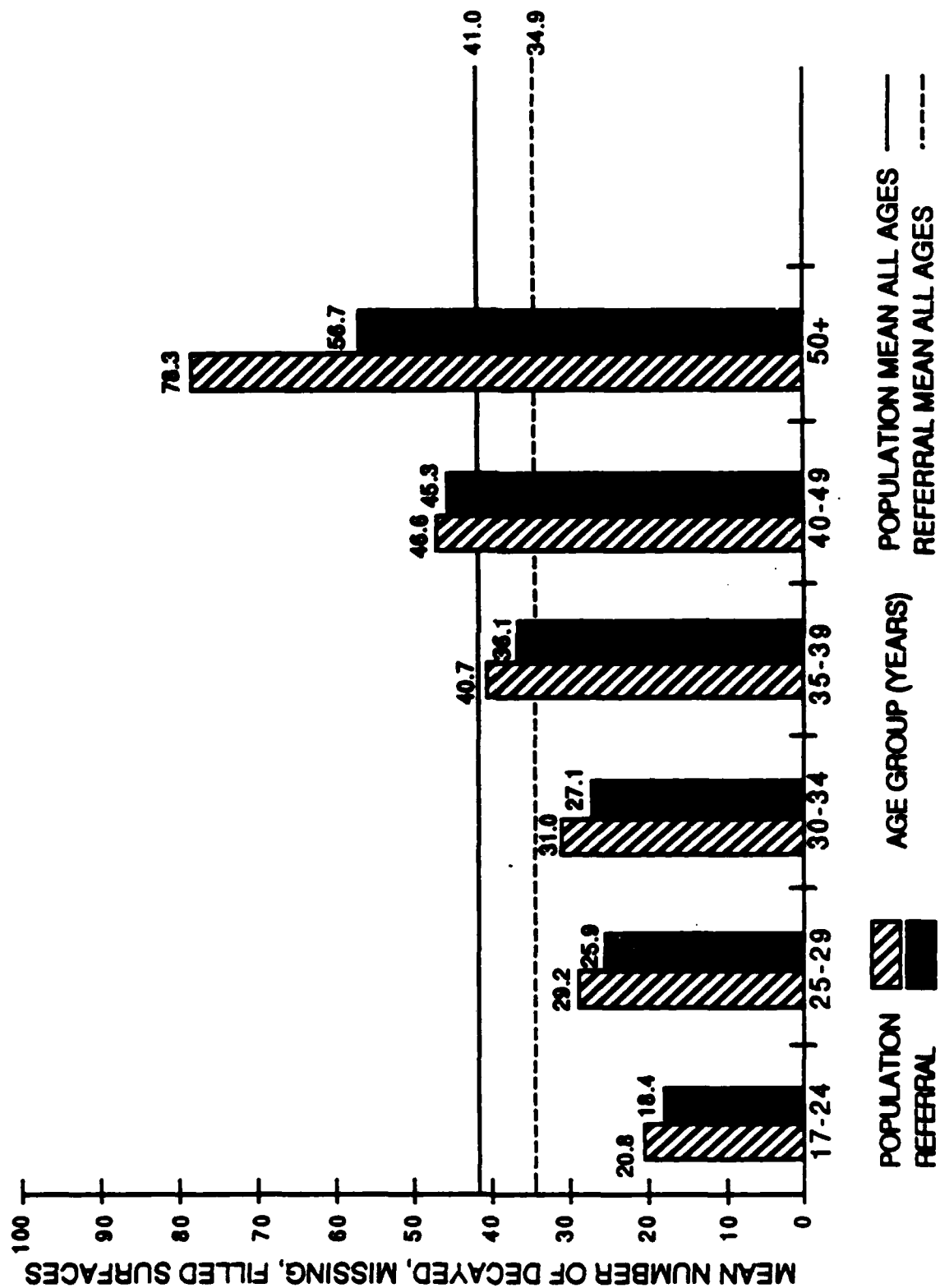
Figure 2. DMF surfaces: referral vs. population excluding third molars.

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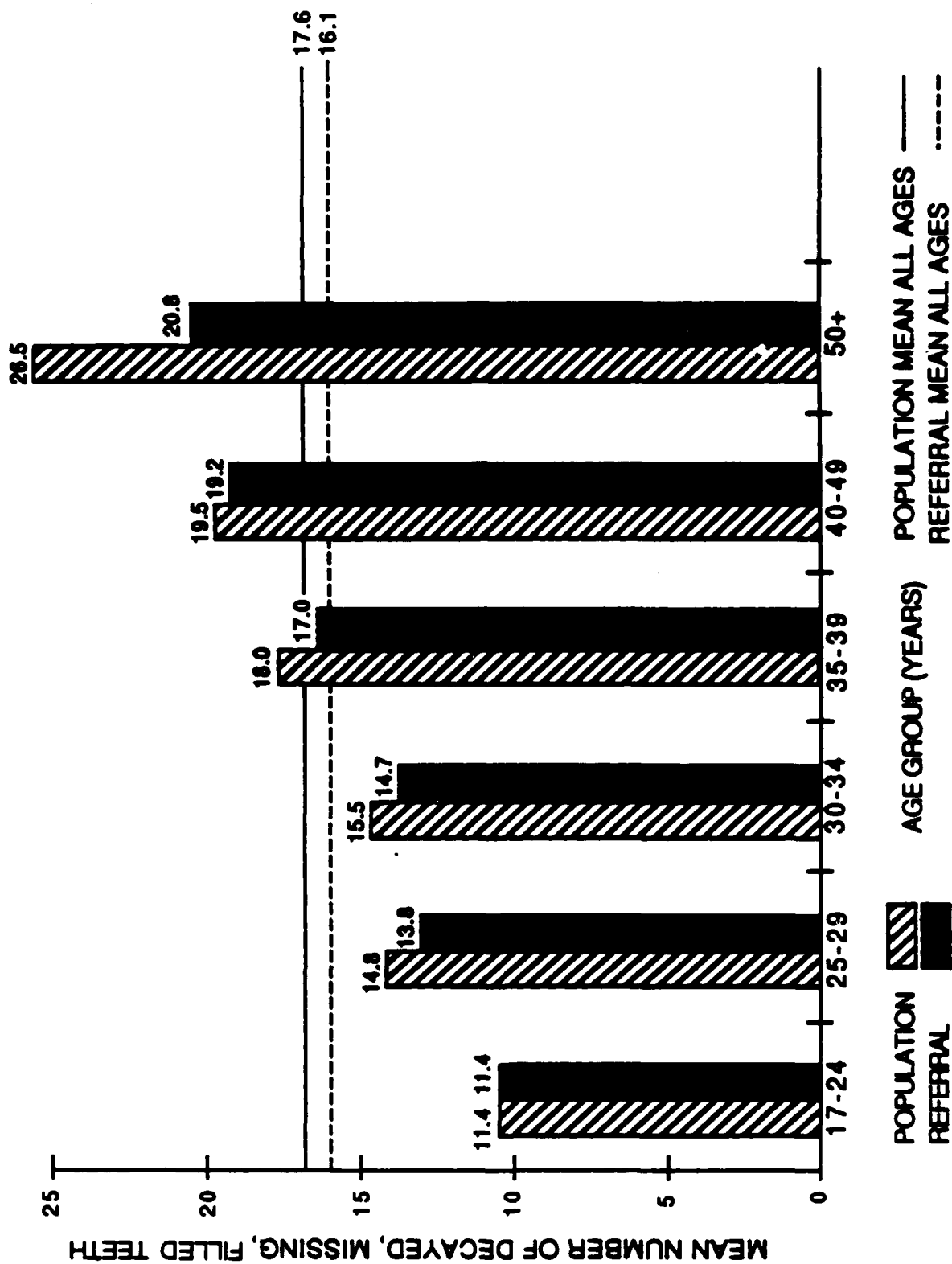
Figure 3. DMF teeth: referral vs. population including third molars.
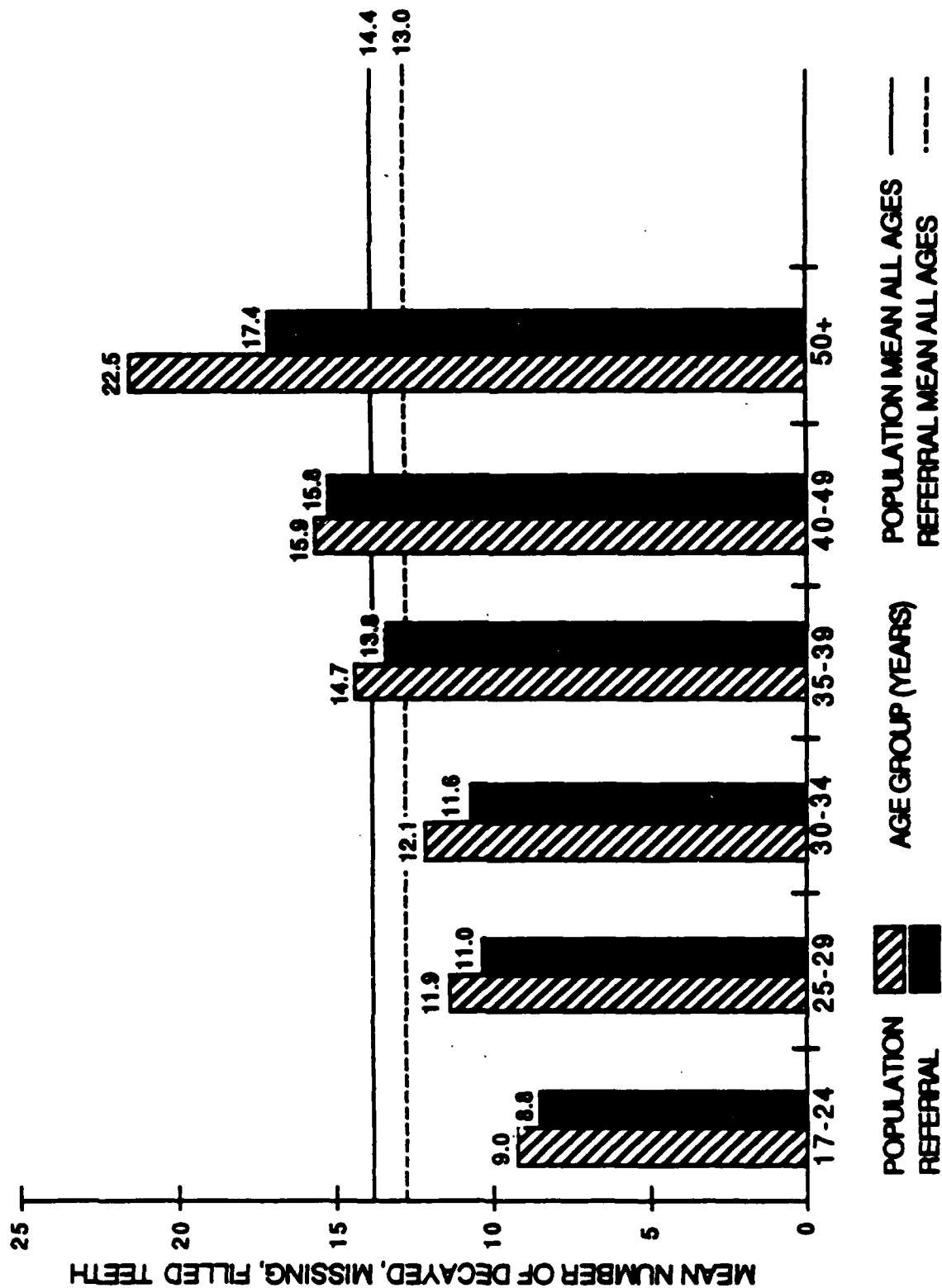
Figure 4. DMF teeth: referral vs. population excluding third molars.
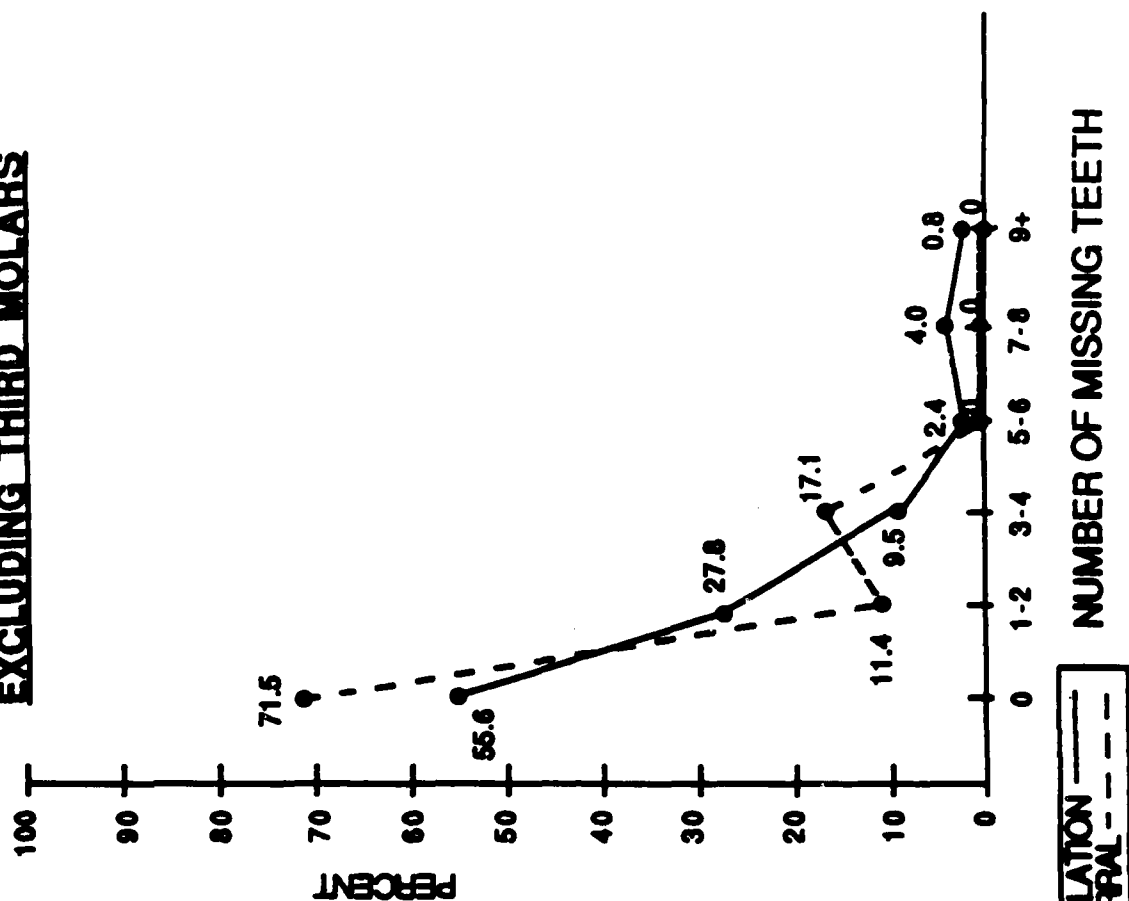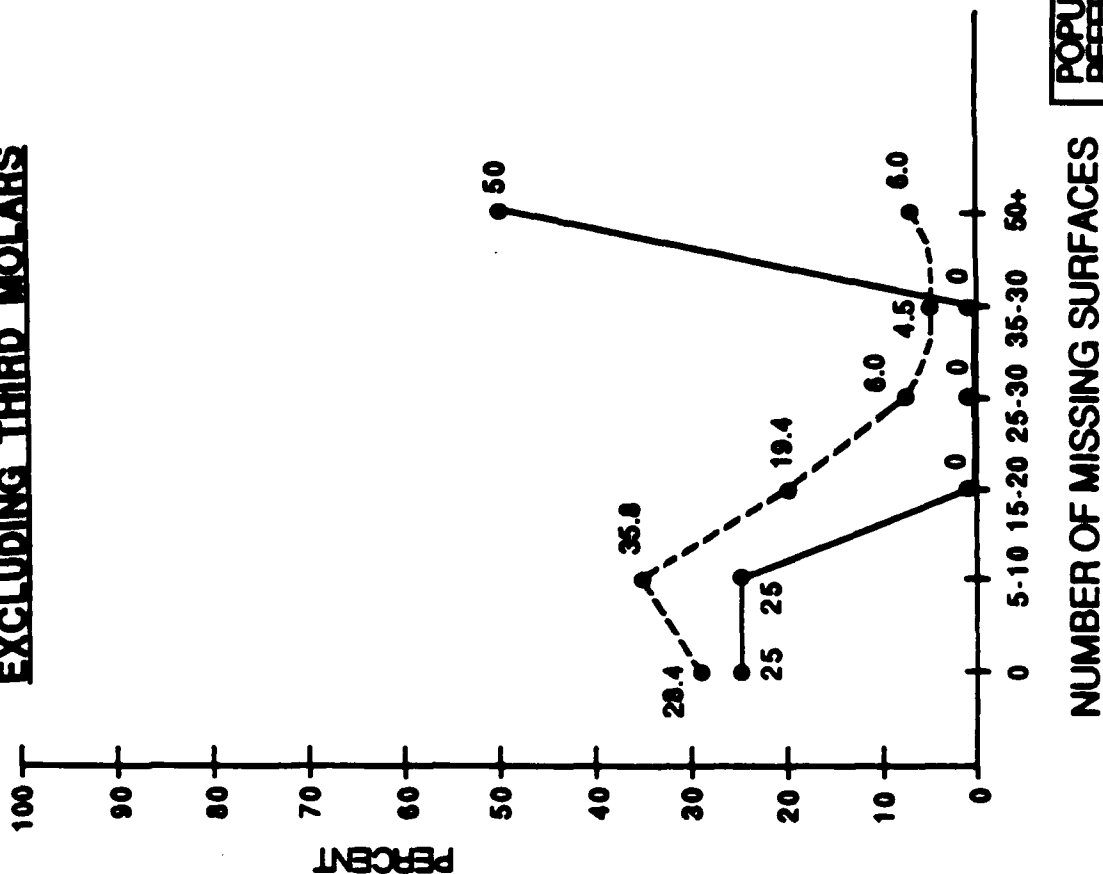
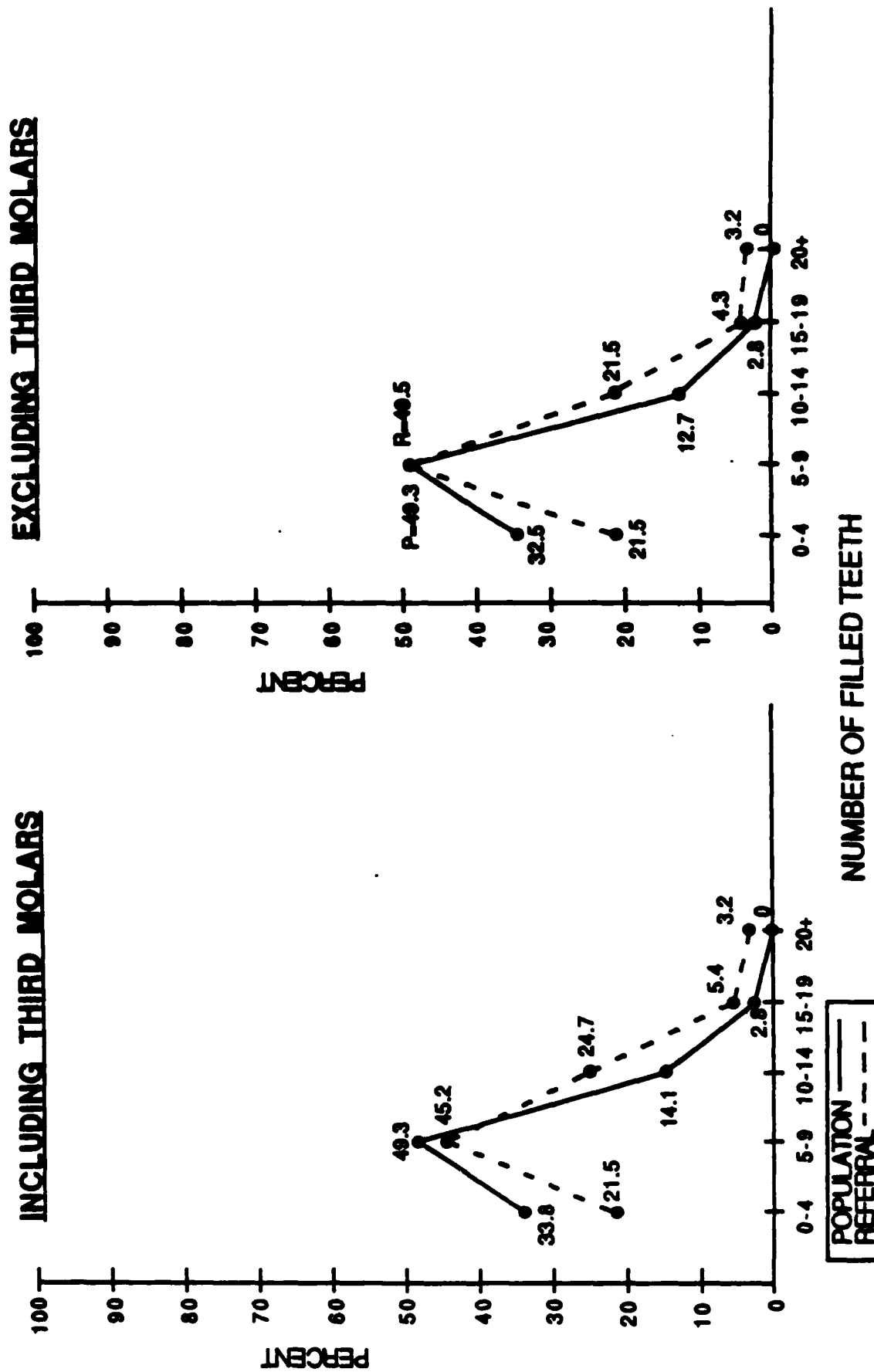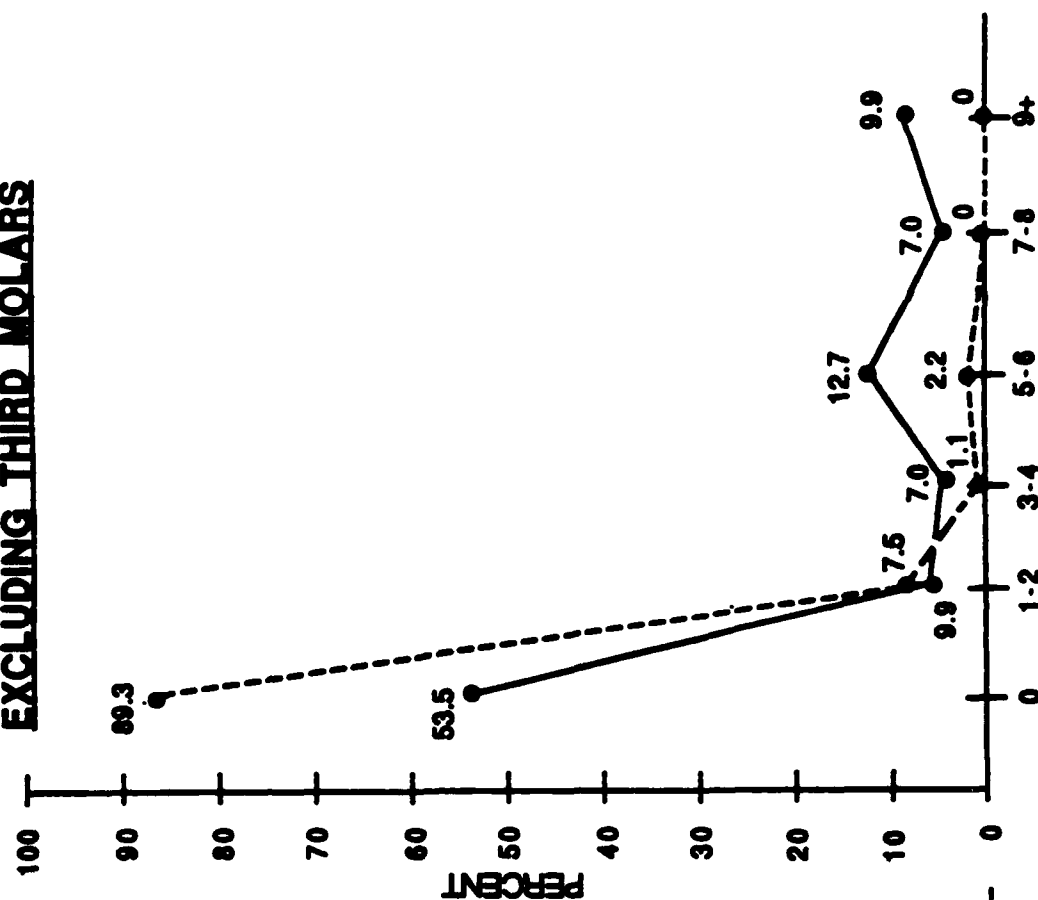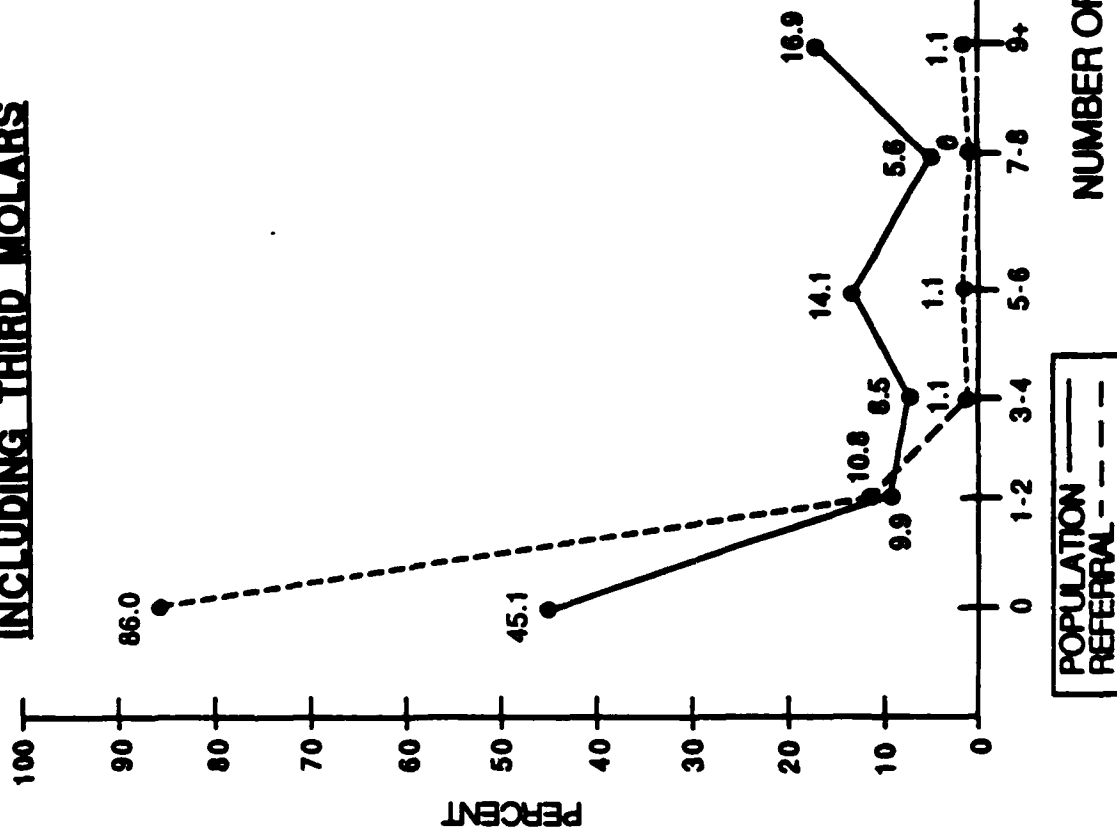Figure 5. Percent of missing surfaces and missing teeth: referral vs. population - age group 30-34 years.

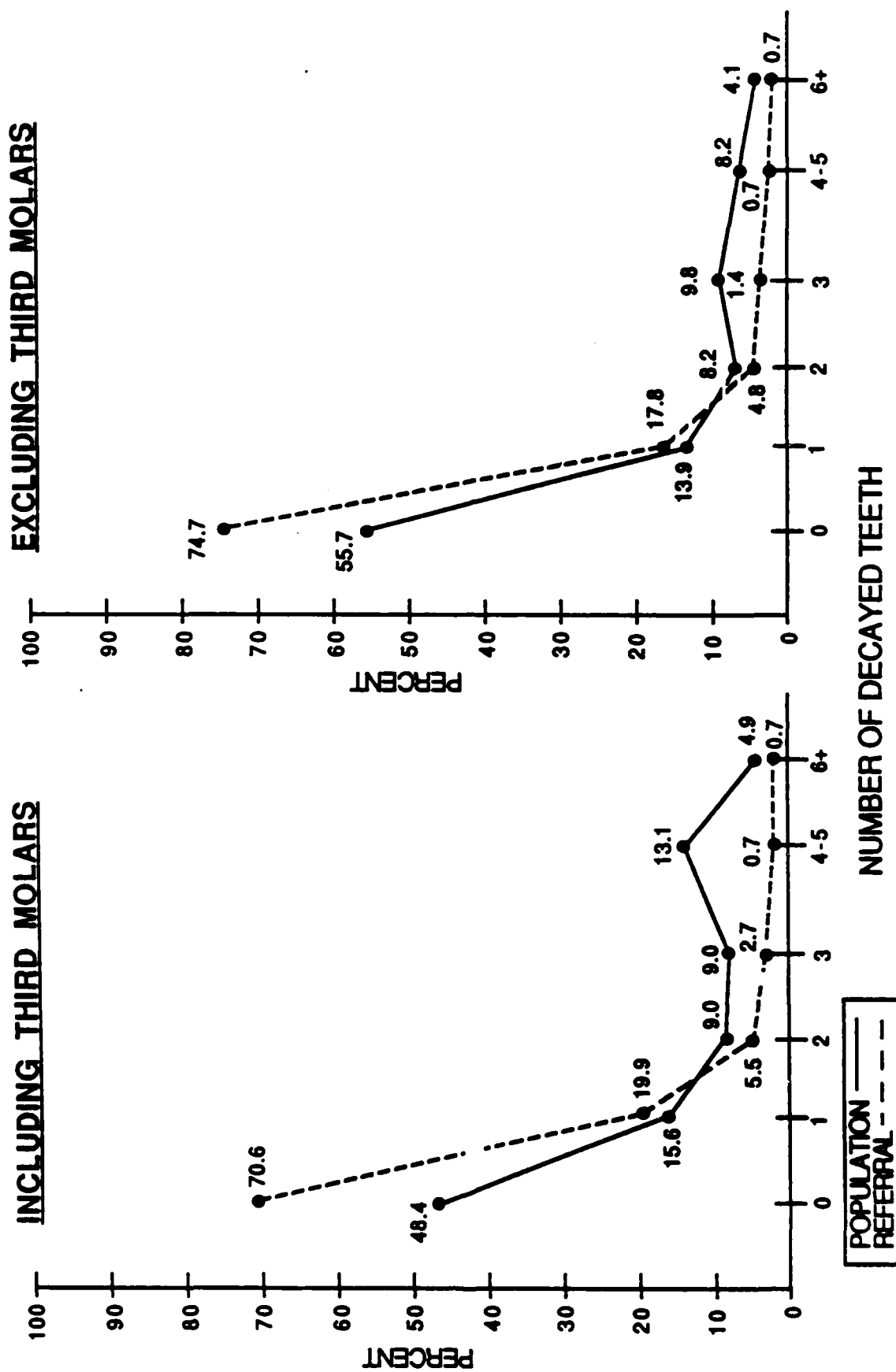Figure 6. Percent of filled teeth: referral vs. population — age group 17-24 years;

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Figure 7. Percent of decayed surfaces: referral vs. population – age group 17-24 years.
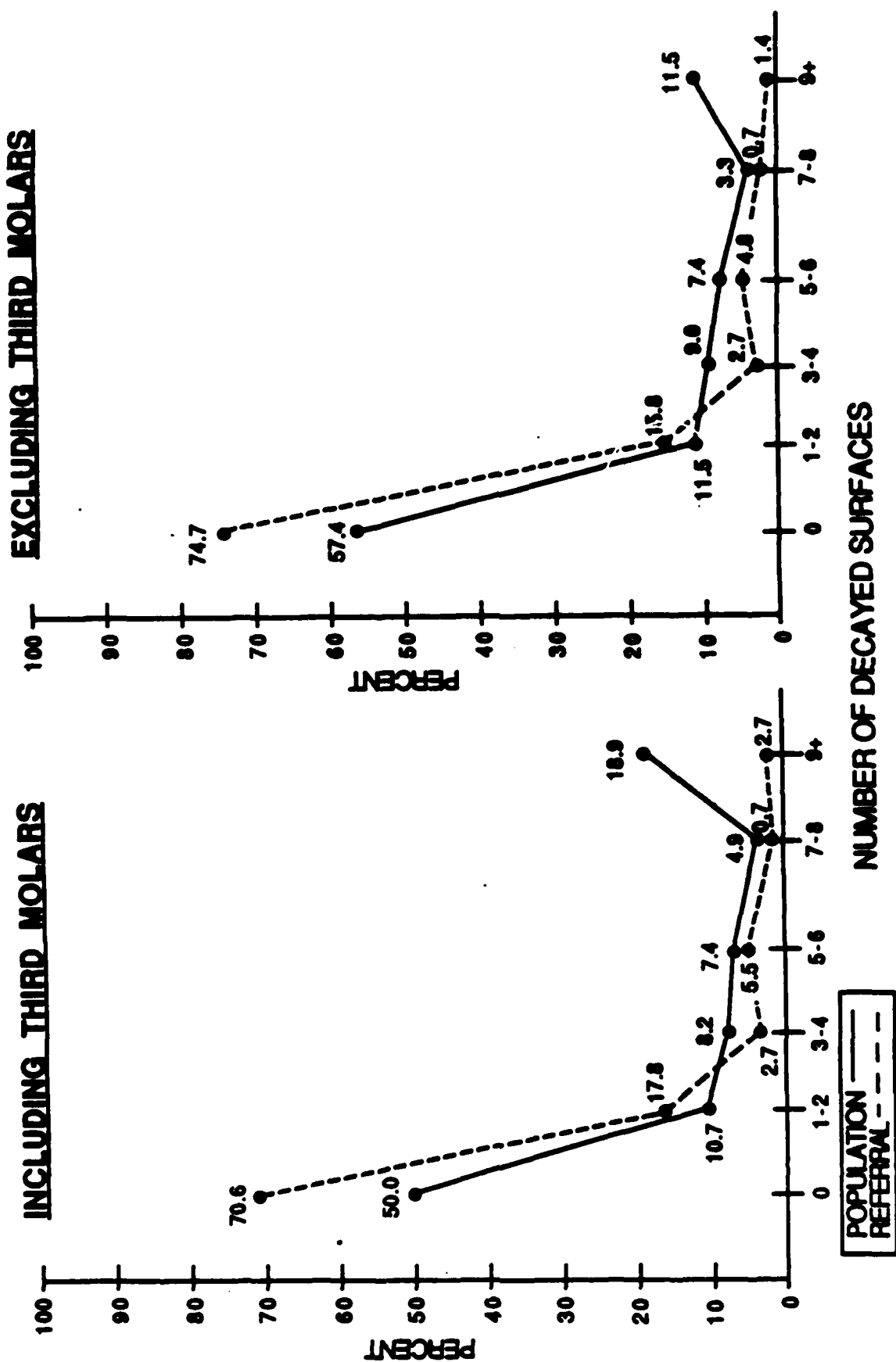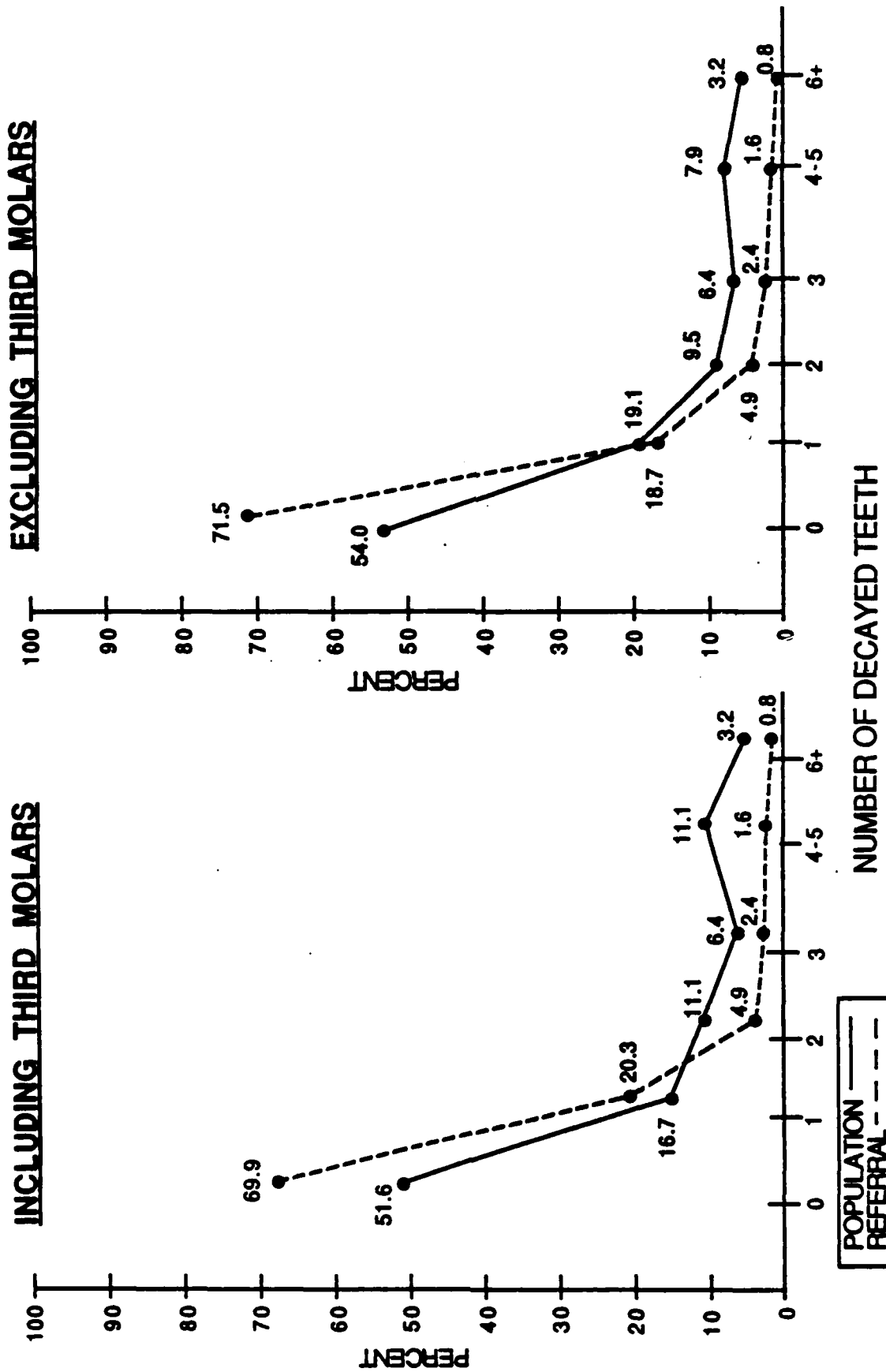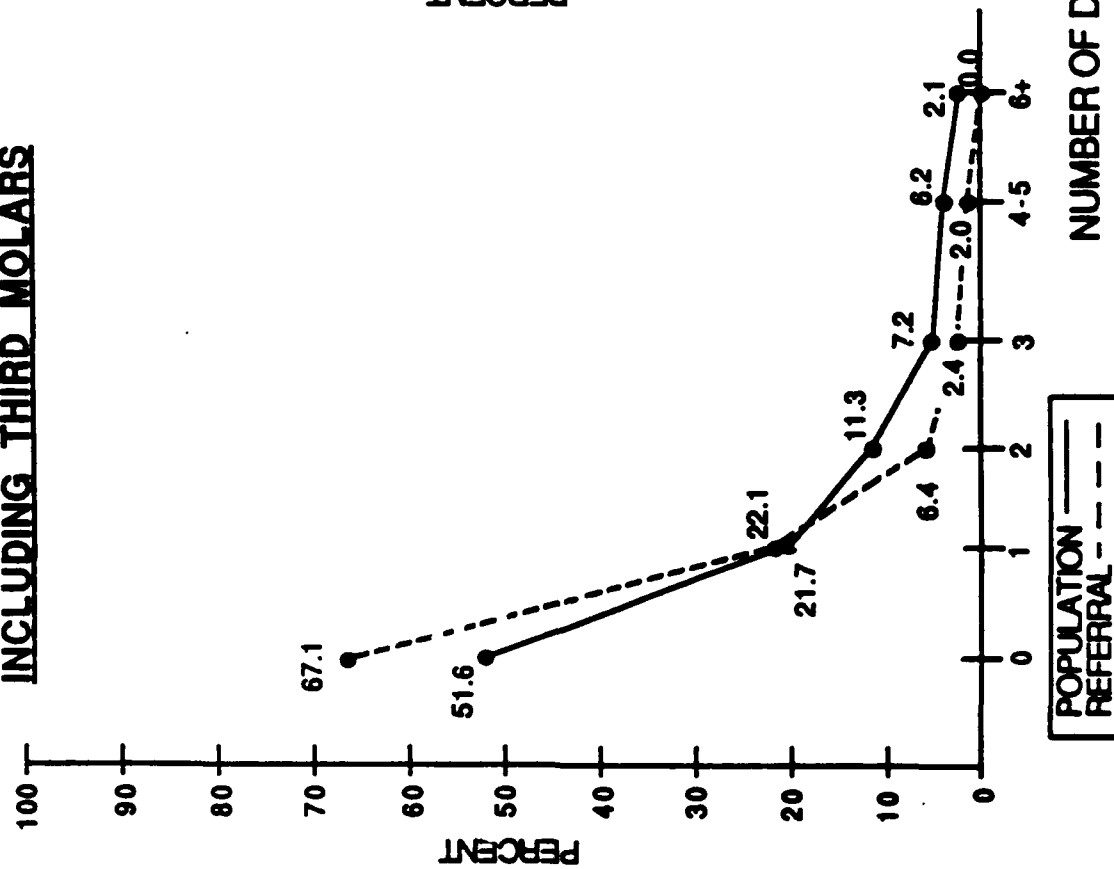
Figure 8. Percent of decayed surfaces: referral vs. population – age group 25–29 years.
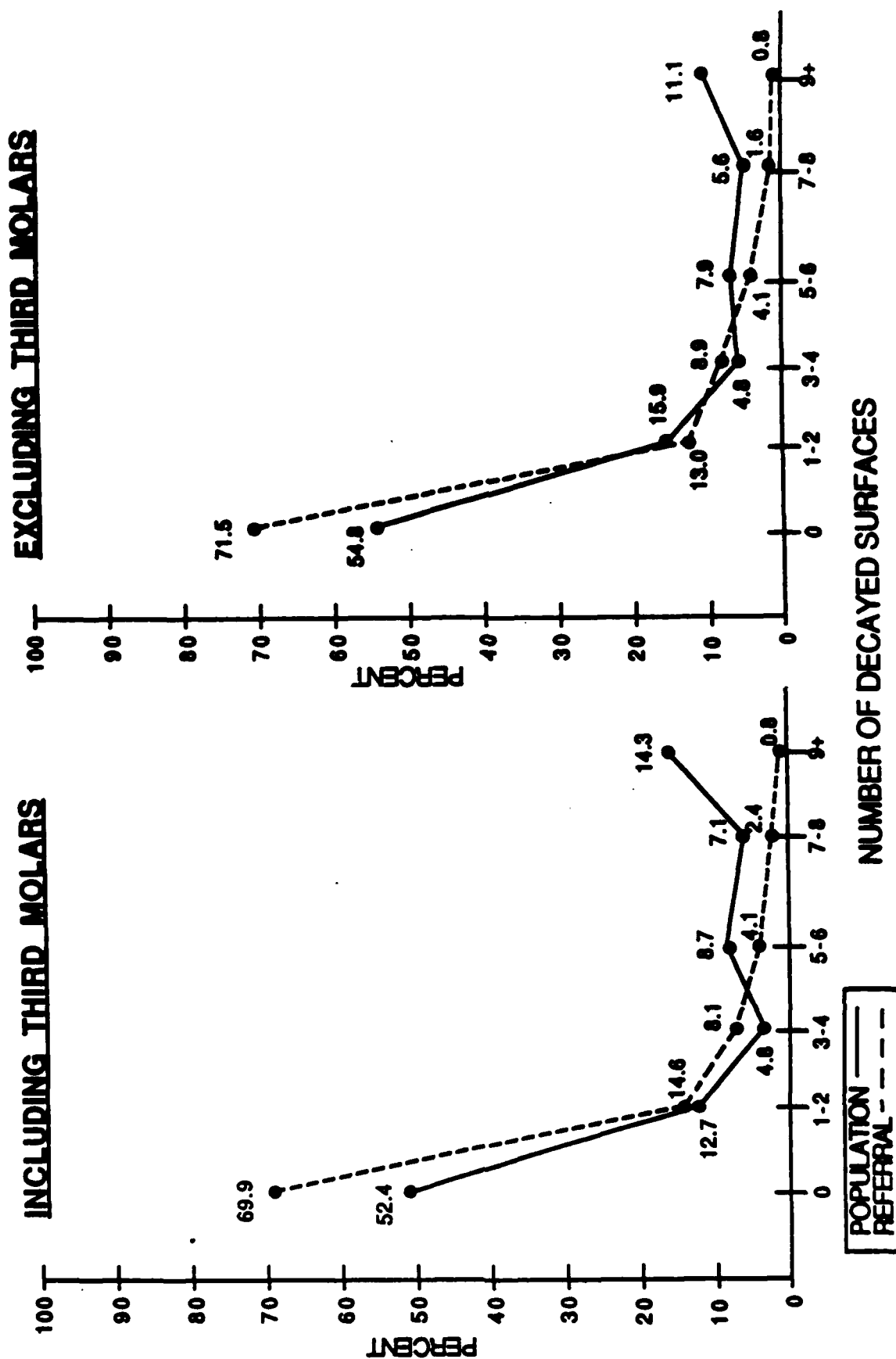
Figure 9. Percent of decayed surfaces: referral vs. population - age group 30-34 years.

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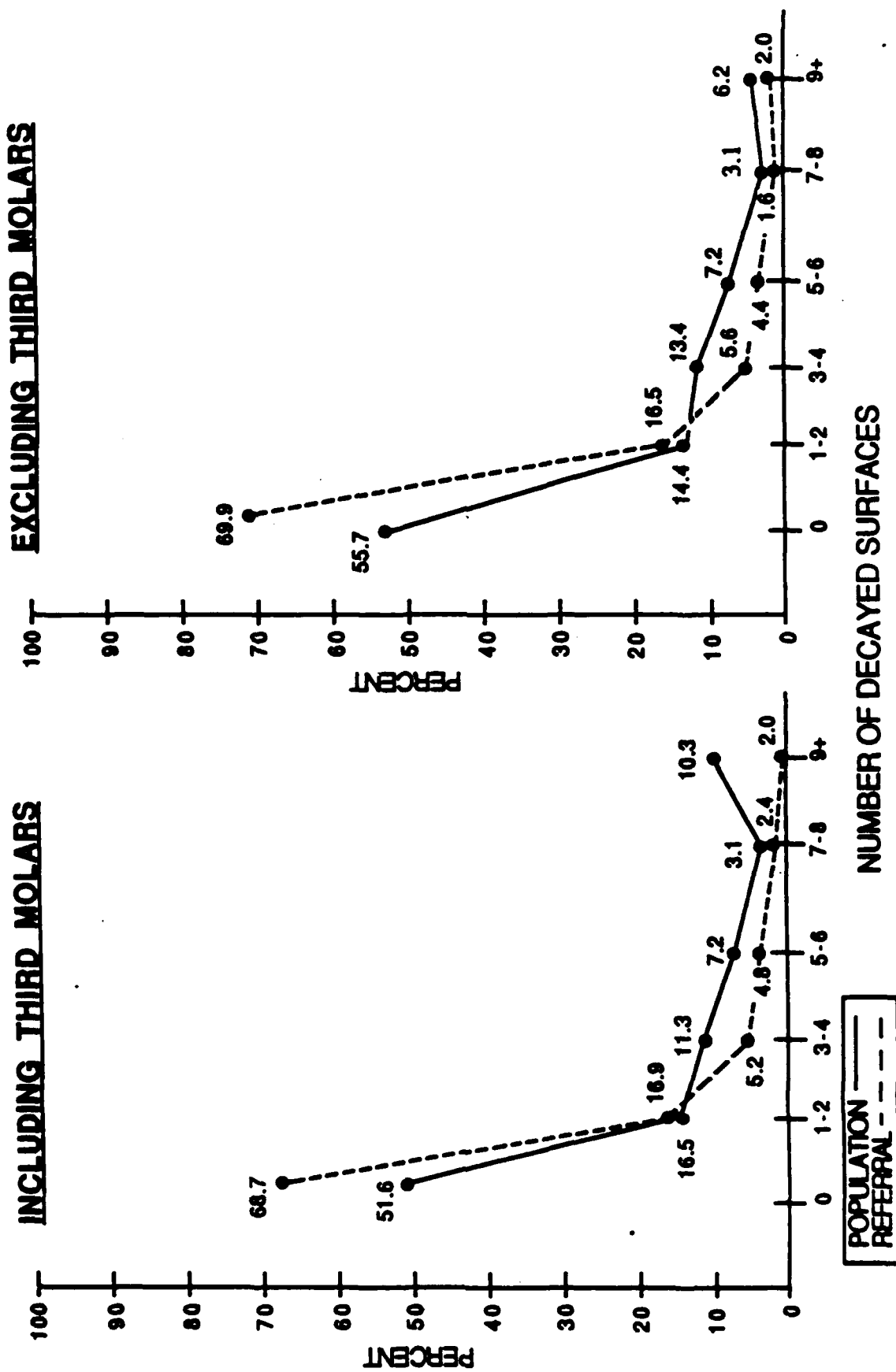
Figure 10. Percent of decayed surfaces: referral vs. population –
age group 35-39 years.
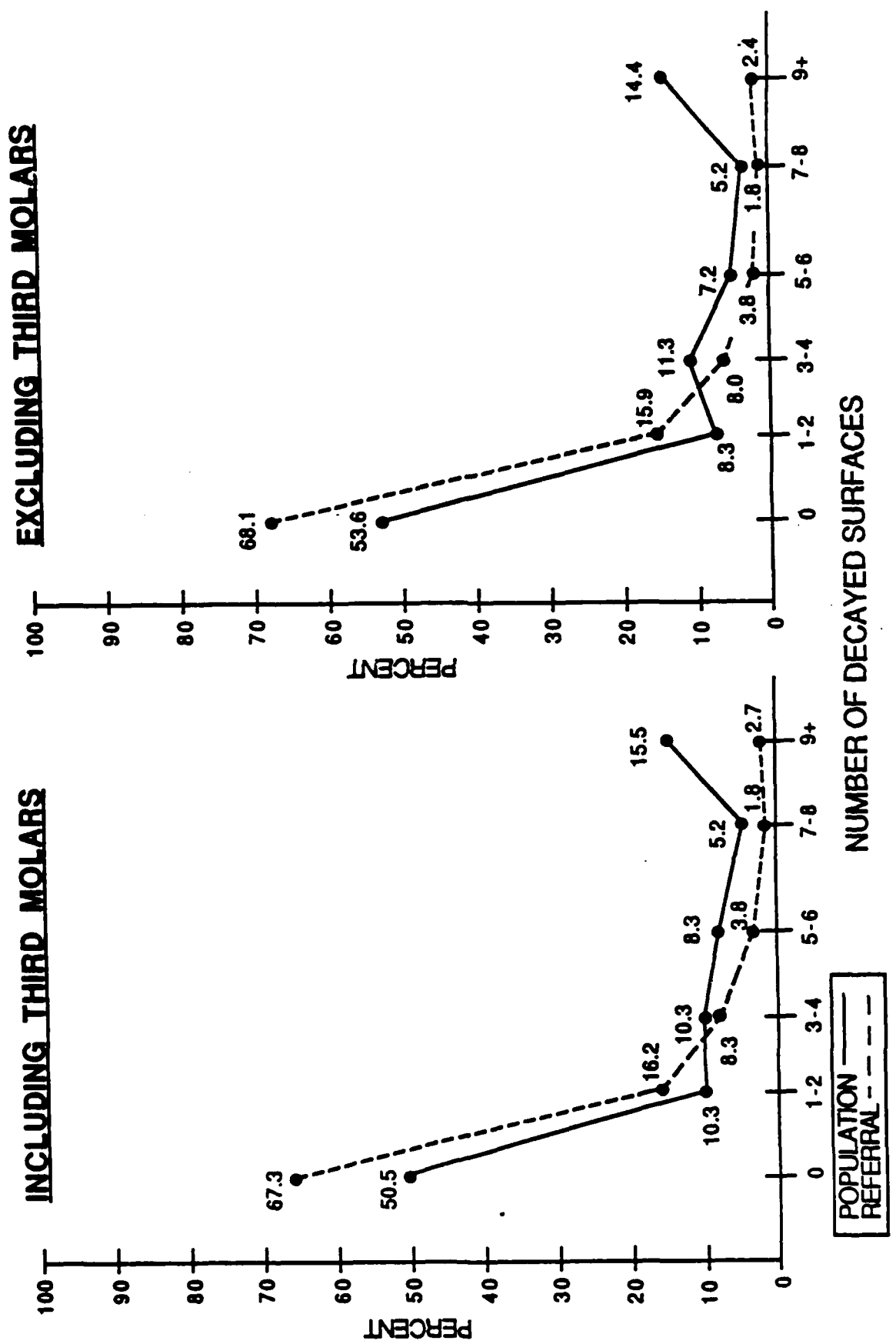
Figure 11. Percent of decayed surfaces: referral vs. population – age group 40–49 years.
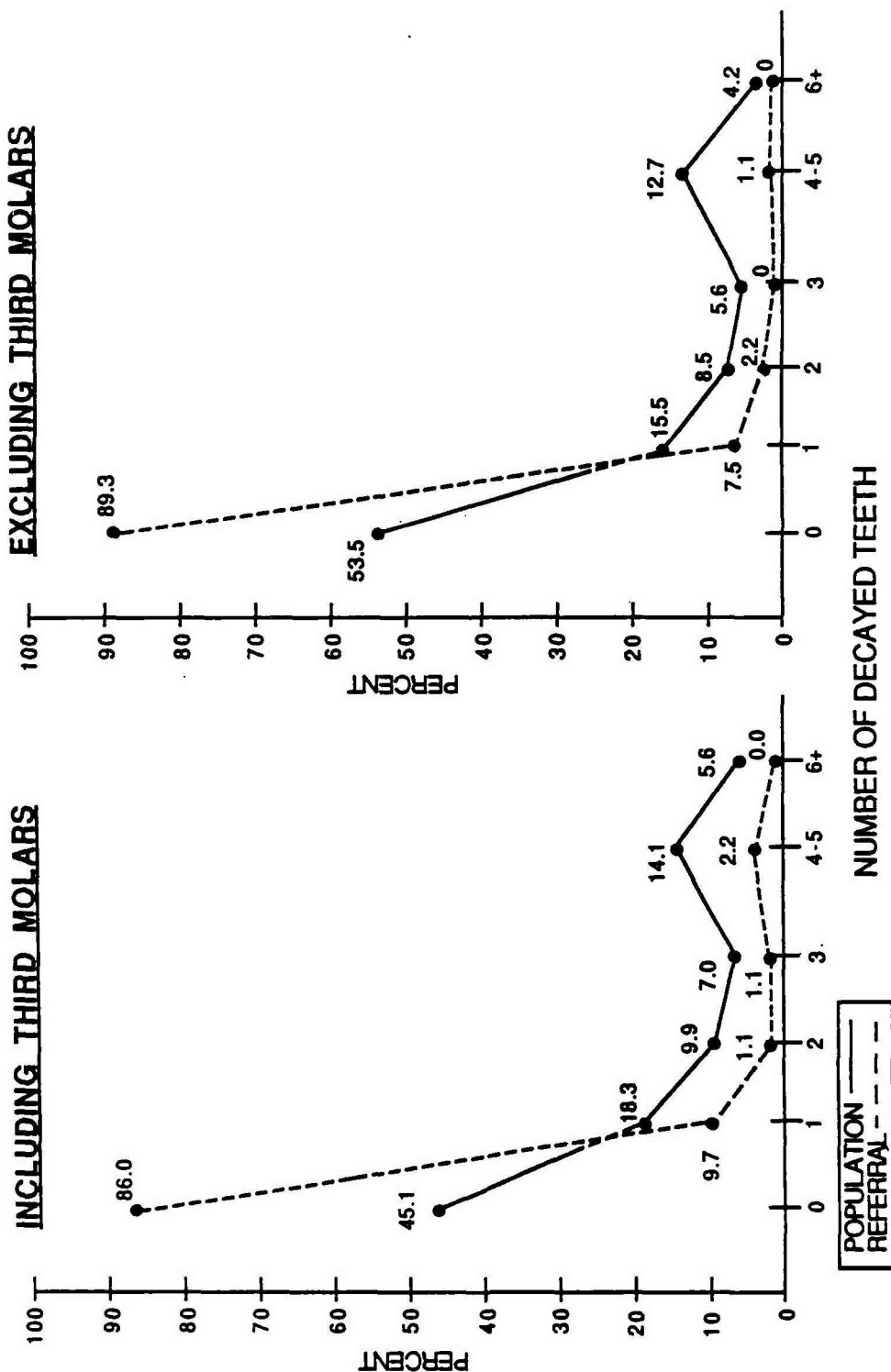
Figure 12. Percent of decayed teeth: referral vs. population – age group 17–24 years.
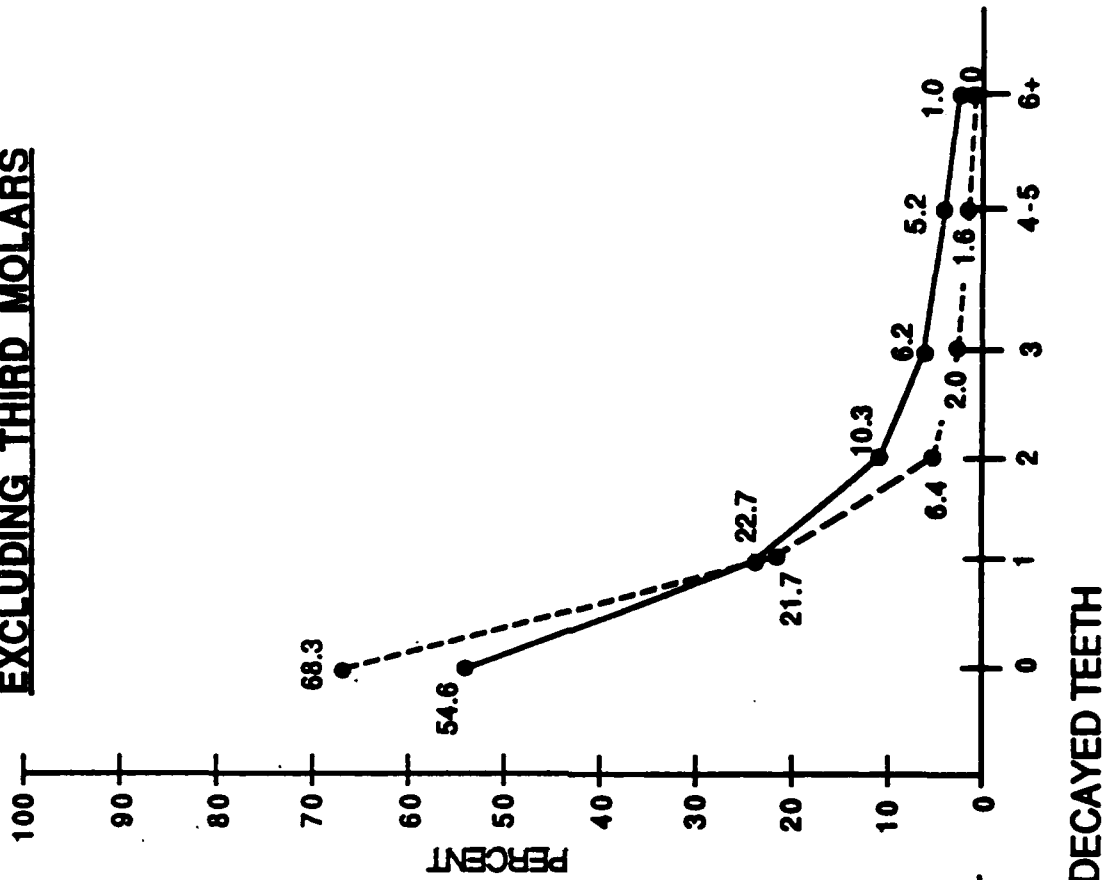
Figure 13. Percent of decayed teeth: referral vs. population - age group 25-29 years.

Figure 14. Percent of decayed teeth: referral vs. population – age group 30-34 years.

Figure 15. Percent of decayed teeth: referral vs. population – age group 35-39 years.
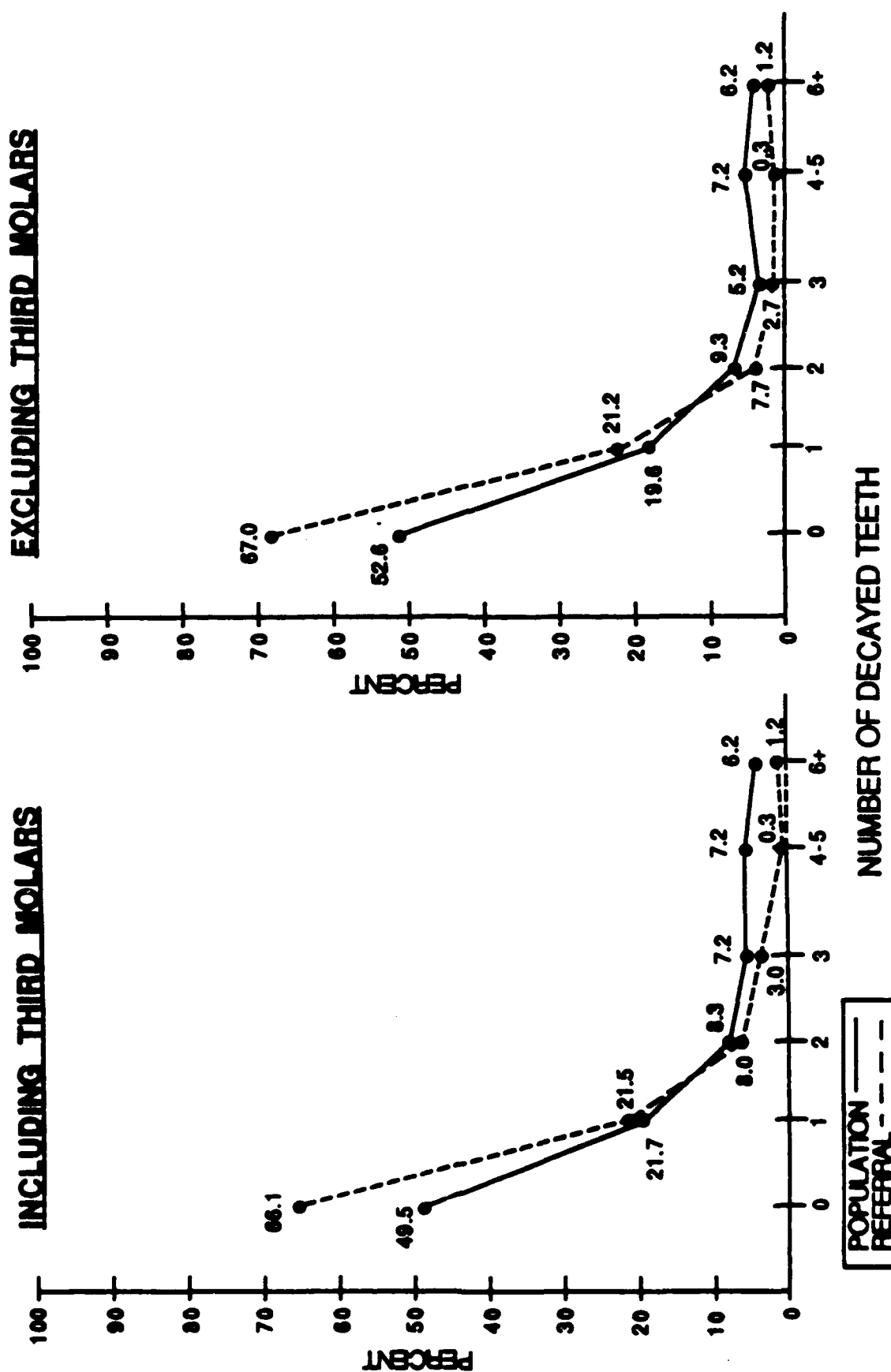
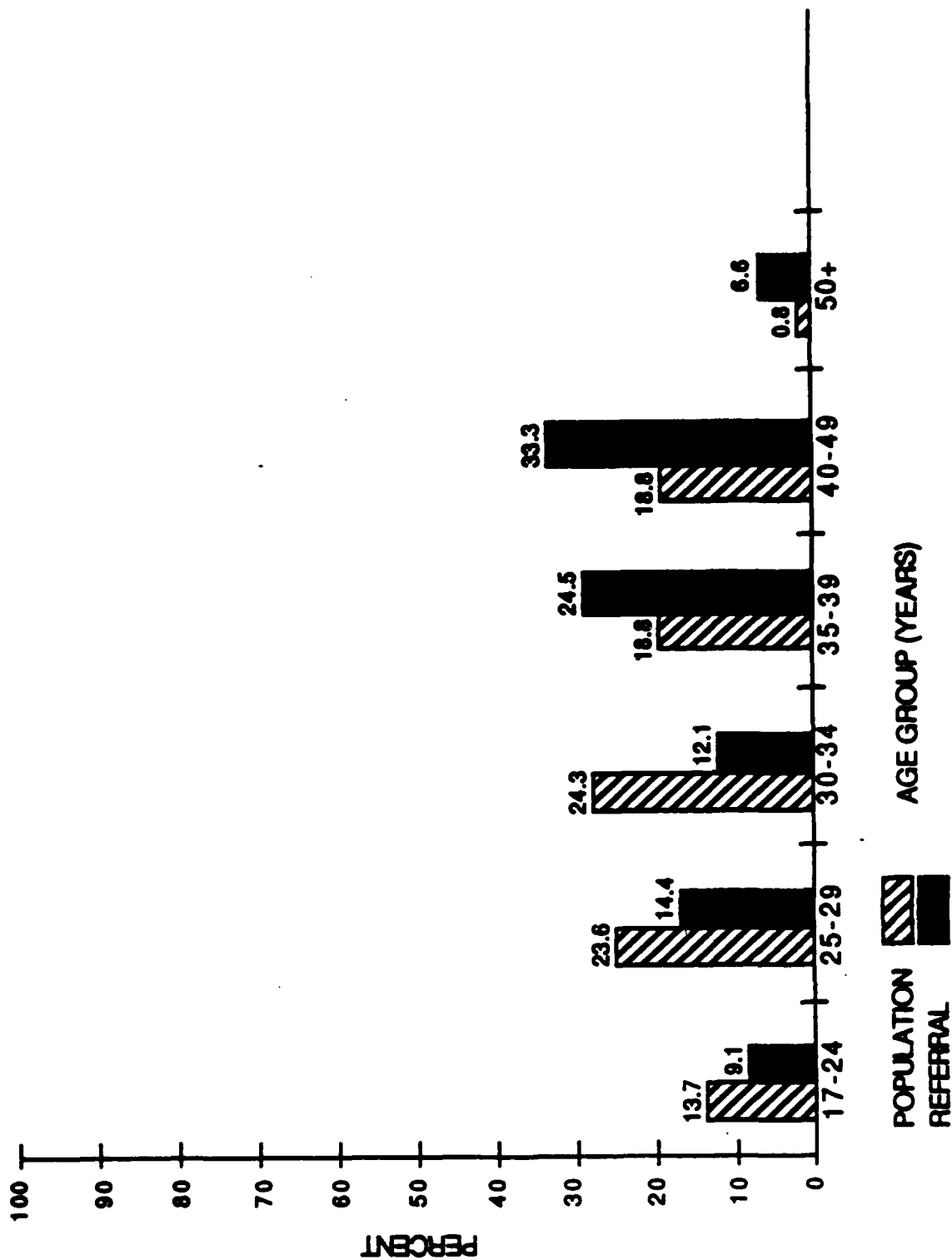Figure 16. Percent of decayed teeth: referral vs. population — age group 40-49 years.

Figure 17. Percent in each age group: referral vs. population.